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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/843,936	04/27/2001	Peter Jeremy Dodd	697.024US1	8635

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EXAMINER	
LEUNG, JENNIFER A	
ART UNIT	**PAPER NUMBER**
1764	

DATE MAILED: 12/19/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/843,936	DODD ET AL.
	Examiner	Art Unit
	Jennifer A. Leung	1764

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 November 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *31 and 35-40* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *31 and 35-40* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Amendment

1. Applicant's request for reconsideration of the finality of the rejection of the last Office action filed on November 21, 2003 is persuasive and, therefore, the finality of that action is withdrawn. Claims 1-30 and 32-34 are cancelled. Claims 31 and 35-40 remain active.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 31 and 35-38 are rejected under 35 U.S.C. 102(e) as being anticipated by Galloway (US 6,187,465).

Regarding claims 31 and 38, Galloway (FIG. 2; column 5, line 40 to column 7, line 3) discloses a system comprising:

an electrolyzer **180** (column 6, lines 56-59) adapted to be connected to supplies of water and electricity (i.e., electricity **174** and/or solar panels **190**) and operable to provide electrolysis of water to generate hydrogen (i.e., hydrogen exiting line **182**);

a first reactor (i.e., methanol synthesis plant **130**) connected to the electrolyzer **180** to receive hydrogen via line **182** from the electrolyzer **180** and to react the hydrogen with carbon dioxide to form methanol (i.e., methanol exiting line **142**);

a storage unit (i.e., methanol tank **140**) connected to the first reactor **130** via line **142** for storing of said methanol;

a second reactor (i.e., steam reformer **150**) connected to said storage unit **140** via line **154** to receive the methanol from the storage unit **140** and to convert the methanol back into hydrogen and carbon dioxide (i.e., conversion to syngas in line **156**); and

means for recycling the carbon dioxide produced in the second reactor **150** to the first reactor **130** (i.e., carbon dioxide fed via recycle line **162** to feed line **114**).

Regarding claim 35, Galloway further discloses an additional source of carbon dioxide in addition to the recycling means (i.e., carbon dioxide generated in reformer **120** from solid carbonaceous feedstock **100**; column 6, lines 35-43; FIG. 2).

Regarding claims 36 and 37, Galloway further discloses a generator (i.e., fuel cell **170**; column 6, lines 51-54; FIG. 2) for receiving the hydrogen from the second reactor **150** via line **168** and generating electricity **174** using said hydrogen.

Instant claims 31 and 35-38 structurally read on the apparatus of Galloway.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over Galloway (US 6,187,465) in view of Cummings (WO 95/31423).

Galloway is silent as to whether the system may further comprise a second storage unit, for storing the carbon dioxide produced in the second reactor **150**. Cummings teaches a system for producing methanol, similar to the system disclosed by Galloway, wherein the system of

Cummings comprises a methanol synthesis unit **14** that receives, "a purified form of (excess) carbon dioxide... output by pipelines(s) **122**," wherein "The carbon dioxide also can be stored so that *a stand-by supply* is available for the methanol synthesis unit **14**," (FIG. 1; page 4, lines 25-28). Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to provide a second storage unit for storing carbon dioxide to the apparatus of Galloway, because the second storage unit would provide a stand-by supply of carbon dioxide for methanol synthesis in the first reactor, as taught by Cummings.

4. Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Galloway (US 6,187,465) in view of Houseman et al. (US 4,567,857).

Galloway is silent as to the system further comprising an internal combustion engine, wherein said second reactor **150** provides hydrogen to the internal combustion engine for the generation of electrical power. Houseman et al. teaches an apparatus wherein methanol fuel **56** is supplied via line **22** to a methanol-reforming reactor **10**, which decomposes the methanol to form a hydrogen-rich fuel stream **26** that is subsequently fed to an internal combustion engine **28** via line **46** (FIG. 1; column 5, lines 28-62). It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide an internal combustion engine to the apparatus of Galloway, on the basis of suitability for the intended use, since the substitution of one known equivalent technique for another (i.e., for the same purpose of generating electrical power) may be obvious even if the prior art does not expressly suggest the substitution. *Ex parte Novak* 16 USPQ 2d 2041 (BPAI 1989); *In re Mostovych* 144 USPQ 38 (CCPA 1964); *In re Leshin* 125 USPQ 416 (CCPA 1960); *Graver Tank and Manufacturing Co. v. Linde Air Products Co.* 85 USPQ 328 (USSC 1950), and furthermore, supplying methanol in the form of a

decomposed, hydrogen-rich fuel stream to an internal combustion engine eliminates the production of solid carbon or soot at the normal temperature range of exhaust gases of internal combustion engines, as taught by Houseman et al. (column 2, lines 23-39; column 3, lines 3-14).

5. Claims 31 and 35-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Long (US 4,189,925) in view of Karasawa et al. (JP 06-295736).

Regarding claim 31 and 36-38, Long (FIG. 1, 2) discloses a system comprising:

an electrolyzer adapted to be connected to supplies of water and electricity and operable to provide electrolysis of water to generate hydrogen (i.e., a conventional water electrolysis plant **12** used to break down water from an external source **14**, powered by electricity generating station **10**; column 2, lines 54-63);

a first reactor (i.e., hydrocarbon formation means **16**) connected to the electrolyzer **12** to receive hydrogen from the electrolyzer **12** and to react the hydrogen with carbon dioxide (i.e., from source **18**) to form a hydrocarbon fuel, such as methanol (column 2, line 64 to column 3, line 5);

a storage unit (i.e., a conventional storage means **20**; column 3, lines 6-15) connected to the first reactor **16** for storing of methanol; and

a means for utilizing the hydrocarbon fuel to generate electric power (i.e., peaking turbine **22**, or turbogenerator **30**) connected to the storage unit **20**, to receive and convert the methanol into electric power (column 3, lines 16-44; column 3, line 61 to column 4, line 10).

Long further discloses, "*alternate means* for utilizing the hydrocarbon fuel to generate electric power may be used," (column 4, lines 16-18). However, Long is silent as to,

a) whether the alternate means may comprise a second reactor, such as a steam reformer, for

converting the methanol back into hydrogen and carbon dioxide; and a generator, such as a fuel cell, for receiving the hydrogen from the second reactor and generating electric power using the hydrogen; and

b) whether the system may further comprise a means for recycling the carbon dioxide generated by the second reactor to the first reactor **16**.

Karasawa et al. (see FIG. 2; Abstract) teaches a system similar to the system of Long, wherein the system of Karasawa et al. comprises an electrolyzer (i.e., electrolysis tank 7; section [0016]) for generating hydrogen from water and electricity and a first reactor (i.e., catalyst tank **6**; section [0012]) for reacting the hydrogen with carbon dioxide to produce methanol; wherein the system further integrates,

a') an alternate means for utilizing hydrocarbon fuel to generate electric power, said alternate means comprising a second reactor (i.e., steam reformer **2/3**) that supplies a conventionally known phosphoric-acid-type fuel cell (i.e., PAFC **1**) with a reformed supply of a "... material gas (natural gas which makes methane a principal component), *or methanol*," (section [0003]) to generate electrical power; and

b') a means for supplying carbon dioxide generated in the second reactor **2/3** to the first reactor **6** for the generation of methanol, substantially comprising the recited, "means for recycling carbon dioxide" (i.e., CO_2-containing stream from combustor **3** to reactor **6**, and CO_2-containing stream from reformer **2**, via PAFC **1**, to reactor **6**; sections [0011]-[0013], [0015]-[0019]).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute the steam reformer and fuel cell combination of Karasawa et al. (section

a') for the "means for utilizing hydrocarbon fuel to generate electric power" in the apparatus of Long, since the steam reformer and fuel cell combination would comprise a known *alternate means* for utilizing the synthesized methanol for the generation of electric power, and it has been held that the substitution of one known equivalent technique for another (i.e., for the same purpose of generating electrical power) may be obvious even if the prior art does not expressly suggest the substitution. *Ex parte Novak* 16 USPQ 2d 2041 (BPAI 1989); *In re Mostovych* 144 USPQ 38 (CCPA 1964); *In re Leshin* 125 USPQ 416 (CCPA 1960); *Graver Tank and Manufacturing Co. v. Linde Air Products Co.* 85 USPQ 328 (USSC 1950). Additionally, it would have been obvious for one of ordinary skill in the art at the time the invention was made to provide a means for recycling carbon dioxide (section b') to the apparatus of Long, since such measures minimize the undesirable release or "burst size" of carbon dioxide into the environment, and since the carbon dioxide is recycled and converted into fuel, the efficiency of the system is improved, as taught by Karasawa et al. (section [0022]).

Regarding claim 35, in the modified apparatus of Long, carbon dioxide source **18** (FIG. 1, 2) would comprise a further source of carbon dioxide in addition to the recycling means.

6. Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over Long (US 4,189,925) in view of Karasawa et al. (JP 06-295736), as applied to claim 31 above, and further in view of Cummings (WO 95/31423).

The collective teachings of Long and Karasawa et al. are silent as to a second storage unit for storing the carbon dioxide produced in the second reactor. The same comments with respect to Cummings (above) apply. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to provide a second storage unit for carbon dioxide to

the modified apparatus of Long, for the reasons taught by Cummings (above).

7. Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Long (US 4,189,925) in view of Karasawa et al. (JP 06-295736), as applied to claim 31 above, and further in view of Houseman et al. (US 4,567,857).

Long further discloses, "*alternate means* for utilizing the hydrocarbon fuel to generate electric power may be used," (column 4, lines 16-18). However, the collective teachings of Long and Karasawa et al. are silent as to whether an internal combustion engine may be used for generating the electric power, wherein the internal combustion engine receives a supply of hydrogen from the second reactor. The same comments with respect to Houseman et al. (above) apply. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to provide an internal combustion engine to the modified apparatus of Long, since the internal combustion engine would comprise a known *alternate means* for utilizing the synthesized methanol for the generation of electric power, and it has been held that the substitution of one known equivalent technique for another (i.e., for the same purpose of generating electrical power) may be obvious even if the prior art does not expressly suggest the substitution. *Ex parte Novak* 16 USPQ 2d 2041 (BPAI 1989); *In re Mostovych* 144 USPQ 38 (CCPA 1964); *In re Leshin* 125 USPQ 416 (CCPA 1960); *Graver Tank and Manufacturing Co. v. Linde Air Products Co.* 85 USPQ 328 (USSC 1950).

Response to Arguments

8. Applicant's arguments with respect to claims 31 and 35-38 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Yasumoto et al. is presented to further illustrate a conventional PAFC, or phosphoric acid fuel cell (i.e., substantially the conventional PAFC as taught by Karasawa et al. above), which utilizes steam reformed methanol as a fuel source (column 1, lines 15-24, 35-51).

* * *

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is *703-305-4951***. The examiner can normally be reached on 8:30 am - 5:30 pm M-F, every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on 703-308-6824. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

*** As of December 10, 2003, the Examiner can be reached at 571-272-1449.*

Jennifer A. Leung
December 8, 2003

Hien Tran

HIEN TRAN
PRIMARY EXAMINER